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09/308.620	07/20/99	TSUBOSAKI	K 501.37120X00

020457 MM92/0314
ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON VA 22209

THAIL

2811

EXAMINER

ART UNIT PAPER NUMBER

03 DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/308,620

Applicant(s)

TSUBOSAKI ET AL.

Examiner

Luan Thai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☒ Responsive to communication(s) filed on 19 January 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) 3, 10 and 15-32 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-9 and 11-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☐ received in Application No. (Series Code / Serial Number) _____.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 14) ☒ Notice of References Cited (PTO-892)
- 15) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 16) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 17) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 18) ☐ Notice of Informal Patent Application (PTO-152)
- 19) ☐ Other: _____.

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DETAILED ACTION

Election/Restriction

1. Applicant's election with traverse embodiment I of Figs. 1-10 (claims 1, 2, 4-9 and 11-14), in Paper No. 12 filed January 19, 2001 is acknowledged. The traversal is on the ground(s) that the generic claim (i.e., claim 1) has not been indicated. The examiner confirms that claim 1 is a generic claim to the listed species.

Specification

2. A substitute specification excluding claims is required pursuant to 37 CFR 1.125(a) because the Preliminary Amendment filed August 18, 1999 is too complicated to enter.

A substitute specification filed under 37 CFR 1.125(a) must only contain subject matter from the original specification and any previously entered amendment under 37 CFR 1.121. If the substitute specification contains additional subject matter not of record, the substitute specification must be filed under 37 CFR 1.125(b) and must be accompanied by: 1) a statement that the substitute specification contains no new matter; and 2) a marked-up copy showing the amendments to be made via the substitute specification relative to the specification at the time the substitute specification is filed.

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Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the limitations of:
- a) a relative deviation amount between a stress neutral plane of the semiconductor chip and a stress neutral plane of the whole of the semiconductor device falling within a range between +60 micrometers and -60 micrometers, as recited in claim 12,
 - b) the limitation of an air vent, as recited in claims 6 and 8, and
 - c) a passage recited in claim 5, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim **12** are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification, as originally filed (regarding to the elected embodiment I of figures 1-10), does not disclose that a relative deviation amount between a stress

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neutral plane of the semiconductor chip and a stress neutral plane of the whole of the semiconductor device falls within a range as recited in claim 12.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 5-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitations of "a passage" recited in claim 5 and "an air exhaust port" recited in claim 6 are unclear as whether these limitations are described the same or different item.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 2, and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Haghiri-Tehrani et al. (US Pat. No. 4,829,666).

Regarding claims 1 and 4, Haghiri-Tehrani et al. disclose (figures 1-5) a semiconductor device including a semiconductor chip 4 disposed in a device hole 3 provided in a tape carrier 1 with one end of a lead 5 on the tape carrier being

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electrically connected to an external terminal of the chip, characterized in that the chip 4 is less in thickness than the tape carrier 1, and that the chip is sealed by a seal resin material 7 such that a principal surface and a back surface of the chip is coated therewith, and that the seal resin material 7 has its upper and lower surfaces substantially identical in level to upper and lower surfaces of the tape carrier 1.

Regarding claim 2, although Haghiri-Tehrani et al.'s reference does not specifically disclose a stress neutral plane extending parallel to the principal surface of the chip at a position along the thickness direction of the tape carrier, this feature is taken to be inherent in Haghiri-Tehrani et al.'s device since the claimed structure is identical to Ohta et al.'s device (figures 1-3).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 5-8 and 11-12, and 14, insofar as in compliance with 35 USC § 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Haghiri-Tehrani et al. (4,829,666).

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Regarding claims **5-8**, Haghiri-Tehrani et al. disclose all the limitations of the claimed invention as detailed above except for a passage (or an air exhaust port) formed at part of the tape carrier to be coupled to a gate of a metal mold structure used during formation of the seal resin. The claimed structure of claims **5-8** are identical to Haghiri-Tehrani et al.'s device regardless of the process used to form the seal resin for the device (e.g.,) because only the final product is relevant, not the process of making such as forming a passage or an air exhaust port at part of the tape carrier to be coupled to a gate of a metal mold structure used during formation of the seal resin for the device. Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marrosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 706.03(e).

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Applicant's claim **11** does not distinguish over the proposed device of Haghiri-Tehrani et al. as detailed above regardless of the process used to form the device, because only the final product is relevant, not the process of making such as the back surface of the chip is polished by a spin etching technique. Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marrosi et al.*, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 706.03(e).

Regarding claim 12, Haghiri-Tehrani et al. disclose all the limitations of the claimed invention as detailed above except for a range of the thickness of the tape carrier and the chip with a relative deviation between the stress neutral planes of the chip and the device. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form Haghiri-Tehrani et al.'s device with the claimed ranges, since it has been held that where the general

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conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 14, Haghiri-Tehrani et al. disclose all the limitations of the claimed invention (including one end of the lead is directly coupled to the external terminal of the chip) as detailed above except for one end of the lead is electroplated. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply electroplating to one end of the lead of Haghiri-Tehrani et al.'s device since electroplating is well known in semiconductor art for easier in the process of making electrical connection between a end lead and a external terminal of a chip.

12. Claims 9 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haghiri-Tehrani et al. (4,829,666) in view of Nakamura (5,729,051).

Regarding claim 9, Haghiri-Tehrani et al. disclose all the limitations of the claimed invention as detailed above except for a bump electrode at the remaining end of the lead for being electrically connected to a mounting board. Nakamura while relates to a similar package design teaches a bump electrode 5 at the remaining end of the lead 3 for being electrically connected to a mounting board. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a gold bump as taught by Nakamura for forming electrical connection between the chip and the mounting board.

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Regarding claim 13, Haghiri-Tehrani et al. disclose all the limitations of the claimed invention as detailed above except for a gold bump electrode at the external electrode of the chip. Nakamura while relates to a similar package design teaches a gold bump electrode form on the external terminal of the chip for making electrical connection with the lead. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use gold bumps as taught by Nakamura for forming electrical connection between the chip external terminal and the lead in Haghiri-Tehrani et al.'s device.

13. Claims 5-8, insofar as in compliance with 35 USC § 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Haghiri-Tehrani et al. (4,829,666) in view of Ueda et al. (5,196,917).

Regarding claim 5, Haghiri-Tehrani et al. disclose all the limitation of the claimed invention as detailed above except for a passage is formed at part of the tape carrier for use in seal resin injection. Ueda et al. while relate to a similar structure design teach (figures 1-9) a passage 14 use in seal resin injection being formed at part of the tape carrier 1 thereby causing the device hole 3 to be coupled to a gate 17 of a metal mold structure 10 used during formation of the seal resin. It would have been obvious to one of ordinary skill in the art at the time the invention was make to apply Ueda et al.'s teachings to Haghiri-Tehrani

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et al.'s device in order to create the same device having characteristics recited in claim 5.

Regarding claim 7, the proposed device of Haghiri-Tehrani et al. and Ueda et al. discloses all the limitations of the claimed invention (including a metal layer 3) as detailed above except for specifying the metal layer being an electroplated metal layer. Forming an electroplated metal layer on a tape carrier or a film carrier is conventional in semiconductor art. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form an electroplated metal layer on the tape carrier of the proposed device of Haghiri-Tehrani et al. and Ueda et al. in order to create the same device having characteristics recited in claim 7.

Regarding claims 6 and 8, the proposed device of Haghiri-Tehrani et al. and Ueda et al. discloses all the limitations of the claimed invention (including an air exhaust port 15 (e.g., 25, 35) as detailed above except for the metal mold structure having an air vent. An air vent forming in a mold is very conventional in semiconductor art, especially in semiconductor molding art, for allowing air to escape during encapsulated injection. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply an air vent to the proposed device of Haghiri-Tehrani et al. and Ueda et al. in order for air to escape during encapsulant injection.

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14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan Thai whose telephone number is (703) 308-1211. The examiner can normally be reached on 7:00 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Luan Thai
March 8, 2001


TOM THOMAS
SUPERVISORY PATENT EXAMINER